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(71) Applicant (for all designated States except US):  
**DECOLEE CO., LTD.** [KR/KR]; Room# 604, Hwayang  
Tower, 110-37, Hwayang-dong, Kwangjin-gu, Seoul  
143-915 (KR).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **GANG, Singi**  
[KR/KR]; #111-407 Namsan Apt., 1083, Kyohyeon-dong,  
Choongju-shi, Choongchungbukdo 380-060 (KR).

(74) Agent: **KIM, Inhan**; 6F, Kyungmin B/D #18-3, Jamwon-  
Dong, Seocho-gu, Seoul 137-903 (KR).

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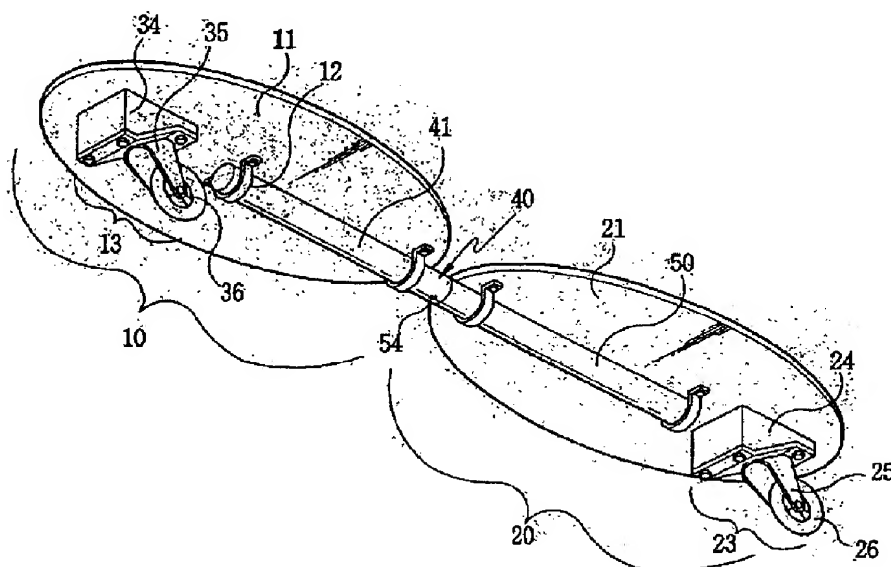
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(54) Title: SKATEBOARD WITH DIRECTION-CASTER



(57) Abstract: Disclosed herein is a skateboard having a front board, a rear board and a connecting element which interconnects the front board and the rear board in a spaced relationship, wherein at least one of the front board and the rear board has one or more than one direction-caster which is mounted on the underside of the plate of the boards. The connecting element has elastic matter in it so that it can be elastically twisted or bent when it receives twisting or bending force and can be restored to its original shape when the force is removed. With this skateboard, the rider can easily turn within a small turning radius, and driving force can be generated by the rider's twisting motion without moving his/her feet.

WO 03/092831 A1



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## SKATEBOARD WITH DIRECTION-CASTER

### Field of The Invention

The present invention relates to a skateboard which comprises two separate  
5 boards(11,21) each of which has a direction-caster(13,23) and a connecting element(40)  
for holding the boards(11,21) at its both ends.

With this skateboard, the rider can easily turn and accelerate the skateboard by twisting  
the boards(11,21).

### Background Art

As it can be seen in FIG. 7a, conventional skateboard comprises an oval  
plate(111) and two wheel-sets(113,123) which are mounted on the underside of the  
plate(111), each of the wheel-sets carries two wheels. With this configuration, the  
conventional skateboard can be accelerated by the rider's stamping onto the ground  
15 and it can be steered to the right or left direction by the rider's leaning to one side or  
the other side of the plate(111). As it can be seen in FIG. 7b, a conventional  
caster(130) comprises a wheel support(134), roller arm(135) and a roller(136). Such a  
conventional caster(130) is generally used as front wheel in a handcart because it  
easily changes its rolling direction by application of a minimal turning force by the  
20 user.

However, without the rider's stamping onto the ground, the conventional  
skateboard cannot be accelerated or can be accelerated only by an extremely skillful  
rider.

Besides, there is another problem that the conventional skateboard cannot be  
25 tilted much for the right or left turn because the plate(111) touches the wheel of the  
wheel-set when the plate(111) is tilted more than a specific angle. With this reason,  
the conventional skateboard can be steered to a relatively small degree, so that it is

not possible to change the direction of the skateboard for making a turn within a small turning radius.

Therefore, it is needed and is the objective of this invention to provide a skateboard which is much more steerable than the conventional skateboard and which  
5 can be accelerated without the rider's stamping onto the ground.

### **Disclosure of the Invention**

In order to achieve the objects above, there is provided a skateboard which has a front board, a rear board and a connecting element which interconnects the two  
10 boards in a spaced relationship, the skateboard comprising:

one or more than one direction-caster which is mounted on the underside of the plate of at least one of the front board and the rear board; and

the connecting element which includes an elastic member so that the connecting element can be elastically twisted or bent when it receives twisting force or bending force and it can be restored to its original shape when the force is  
15 removed.

In accordance with the present invention, the front board may have one or more than one direction-caster and the rear board may have one or more than one fixed roller set.

20 In accordance with the present invention, the connecting element may be a twist-pipe which has elastic material in it.

In accordance with the present invention, the connecting element may comprise the twist-pipe and two elastic members which are provided parallel to the twist-pipe at both sides of the twist-pipe and are connected to the front board and the  
25 rear board at each of their both ends.

In accordance with an aspect of the present invention, there is provided a skating board which has a front board, a rear board and a connecting element which

interconnects the two boards in a spaced relationship, wherein at least one of the front board and the rear board has one or more than one direction-caster skate blade which is mounted on the underside of the plate of the front board and the rear board, the connecting element includes an elastic member so that it can be elastically twisted or bent when it receives twisting force or bending force and it can be restored to its original shape when the force is removed.

### **Brief Description of the Drawings**

Fig. 1 is a perspective view illustrating the shape of a skateboard according to a first embodiment of the present invention;

Fig. 2 is an exploded side view of the direction-caster in Fig. 1;

Fig. 3a, 3b, 3c are plan views showing how to steer the skateboard in Fig. 1;

Fig. 3d is a plan view showing how to generate the driving force of the skateboard in Fig. 1;

Fig. 4a is a cross section view of the twist-pipe in Fig. 1;

Fig. 4b is a perspective view showing the installation of the plate spring in Fig. 4a;

Fig. 5a is the outline of a skateboard according to a second embodiment of the present invention;

Fig. 5b is the outlines of a skateboard according to a third embodiment of the present invention;

Fig. 6 is a perspective view of a skating board skateboard according to a fourth embodiment of the present invention;

Fig. 7a is a perspective view illustrating the shape of a conventional skateboard;

and

Fig. 7b is a side view of a conventional caster.

### **Modes For Carrying Out The Invention**

Hereinafter, the present invention will be described in more detail with reference to the following Examples. However, these examples are given for the purpose of illustration and are not to be construed as limiting the scope of the invention.

#### **Examples**

As it can be seen in Fig. 1, the skateboard with direction-casters according to the present invention comprises two boards, which are the front board (10) and the rear board(20) respectively, and a twist-pipe(40) which interconnects the two boards(10,20) in a spaced relationship.

The board(10or20) comprises a plate(11or21), a direction-caster(13or23) which is mounted on the underside of the plate(11or21) and fastening devices(12) which tightly fasten the board(10or20) to the twist-pipe(40).

As it can be seen in Fig. 2, the direction-caster comprises a wheel support(34) attached to the plate, a roller arm(35) which is pivotably connected to the wheel support(34) and a roller(36) which is rotatably connected to the free-end parts of the roller arm(35). The wheel support(34) has the shape of a wedge, so that an acute angle is formed between the contact surface of the wheel support(34) and the plate(11) and the facing surface of the wheel support(34) and the roller arm(35).

With this skateboard having the direction-casters(13,23), as can be seen in Fig. 3a, if the rider leans the front board(10) to its right side with respect to the advancing direction of the skateboard, the roller arm(35) of the front direction-caster(13) turns to the left side and the roller(36) rolls to the right direction with respect to the advancing direction, so that the rider can turn to the right direction.

Alternatively, as can be seen in Fig. 3b, if the rider leans the rear board(20)

on its right side with respect to the advancing direction, the roller arm(25) of the rear direction-caster(23) turns to the left side and the roller(26) rolls to the right with respect to the advancing direction, so that the rear board(20) turns to the right, with the result that the rider can turn to the left direction.

5 Combining said two effects, as can be seen in Fig. 3c, when the rider leans the front board(10) to its right side and the rear board(20) to its left side with respect to the advancing direction, the rider can turn to the right direction within a small turning radius. In addition, if the rider leans the both boards(10,20) to the same lateral side with respect to the advancing direction, he/she can advance in that direction with  
10 the both boards(10,20) advancing parallelly.

The mechanics for generating the driving force is shown in Fig. 3d, where the rider makes twisting motion to the left direction with respect to the advancing direction. As the rider twists to the left direction, the front board(10) is biased to +y direction and the rear board(20) is biased to -y direction, so that the direction-  
15 casters(13,23) make rolling angles( $\alpha, \beta$ ) with respect to the advancing direction proportional to the magnitude of the biasing forces received by the boards(10,20). And because of the characteristics of the wedge shape of the wheel supports(34,24) which is the components of the direction-casters(13,23), forces( $F_1, F_2$ ) are generated in the rolling direction of the direction-casters(13,23). So the horizontal component  
20 forces( $F_1 \cos \alpha, F_2 \cos \beta$ ) of the forces( $F_1, F_2$ ) generate the driving forces which accelerate the skateboard. As a result, with the skateboard having direction-casters, there is no need for the rider to stamp on the ground for generating the driving force, instead, he/she needs only to twist his/her body right and left without moving his/her feet. And it can be seen in Fig. 3d, the vertical components of the  $F_1$  and  $F_2$   
25 ( $F_1 \sin \alpha, F_2 \sin \beta$ ) make a moment  $M$  to make the skateboard rotate around its center of gravity.

As shown in Fig. 4a, the twist-pipe(40) comprises the front pipe(41), the rear

pipe(50), the inner pipe(52) which is fixedly held in the rear pipe(50) by ball bearing(51) so that it can rotate with respect to the rear pipe(50) but cannot be separated from the rear pipe(50), and the spring lock(53,54) which is fixed in the inner pipe(52) and connects the inner pipe(52) with the front pipe(41) to make the  
5 two pipes(52,41) rotate together.

A plate spring(55), which will be installed in the rear pipe(50), is shown in Fig. 4b. The plate spring(55) is combined to the inner pipe(52) at one end and combined to the rear pipe(50) at the other end by the holders(56), so that the plate spring(55) is elastically twisted by the rotation of the front pipe(41), relative to the  
10 rear pipe(50), caused by the rider's twisting force. At this time, the plate spring(55) provides restoring force when the twisting force is removed. With said configuration, the twist-pipe(40), with the plate spring(55) in it, enables the rider to safely maintain his/her balance by its restoring force generated by the plate spring(55) when the rider  
15 twists the front and rear boards(10,20) right and left to make a turn or to generate driving force while riding the skateboard of the present invention.

Besides, the two boards(10,20) can be separated by pushing the button(54) of the spring lock(53,54), so it is convenient for the rider to keep and carry the skateboard.

In addition, two or more direction-casters(13,23), which are mounted on the  
20 underside of the plates(11,21), can be installed so as to be aligned along a longitudinal axis of the plates(11,21), or so as to be parallel in a side-by-side arrangement. With the longitudinal or the parallel configuration, the skateboard has a relatively larger turning radius, but it ensures greater safety.

As it can be seen in Fig. 5a, the direction-caster(13) is adopted in the front  
25 board(10), but one or more fixed roller sets(61), in which the roller cannot be rotated on the axis of the roller arm, are adopted in the rear board(20). With this configuration, the turning of the skateboard can be effected only by the front



board(10). So, in consideration of safety, this skateboard can be used for young children.

5 In Fig. 5b, the twist-pipe(40) is not equipped with the plate spring device(55,56,57), but there are two flexible rubber members(65) which are parallel to the twist-pipe(40) at both side of the twist-pipe(40). The two flexible rubber members(65) are connected at each of their one ends to the front board(10) and at their other ends to the rear board(20). The restoring force can be obtained by these flexible rubber members(65) when the twist-pipe(40) is twisted.

10 And from the skateboard above, it is conceivable to invent a skating board, as can be seen in Fig. 6, provided with direction-caster skate blades(73,83) that have blades(76,86) instead of the rollers(36,26) in the direction-casters(13,23) in Fig. 1. The skating board is used on ice.

## Claims:

1. A skateboard having a front board, a rear board and a connecting element which interconnects the front board and the rear board in a spaced relationship,  
5 wherein one or more than one direction-caster is mounted on the underside of the plate of at least one of the front board and the rear board; and the connecting element includes elastic member so that the connecting element can be elastically twisted or bent when it receives twisting or bending force and can be restored to its original shape when the force is removed.
- 10 2. A skateboard according to claim 1, wherein the front board has one or more than one direction-caster and the rear board has one or more than one fixed roller set.
- 15 3. A skateboard according to claim 1, wherein the connecting element is a twist-pipe which includes an elastic matter in the twist-pipe.
- 20 4. A skateboard according to claim 1, wherein the connecting element comprises the twist-pipe and two elastic members which are provided parallel to the twist-pipe at both sides of the twist-pipe and are connected at their one ends to the front board and at their other ends to the rear board.
- 25 5. A skating board having a front board, a rear board and a connecting element which interconnects the front board and the rear board in a spaced relationship, wherein one or more than one direction-caster skate blade is mounted on the underside of the plate of at least one of the front board and the rear board; and

the connecting element includes elastic matter so that said connecting element can be elastically twisted or bent when receiving twisting or bending force and is restored to its original shape when the force removed.

1/7

FIG. 1

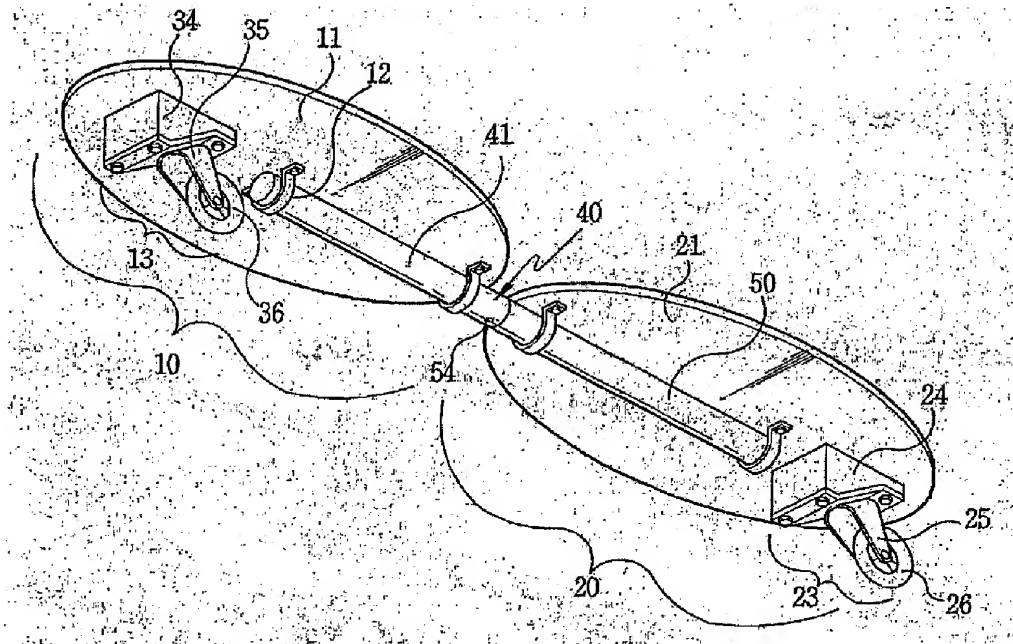
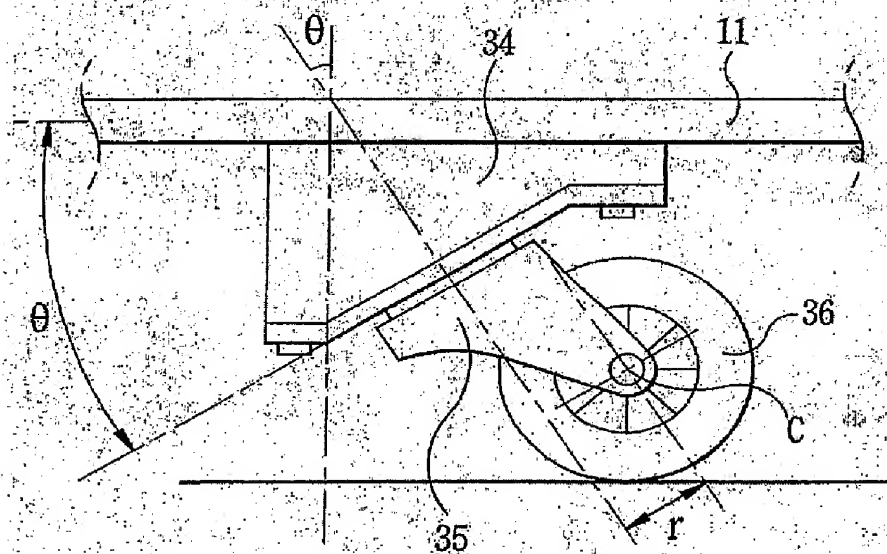


FIG. 2



2/7

FIG. 3a

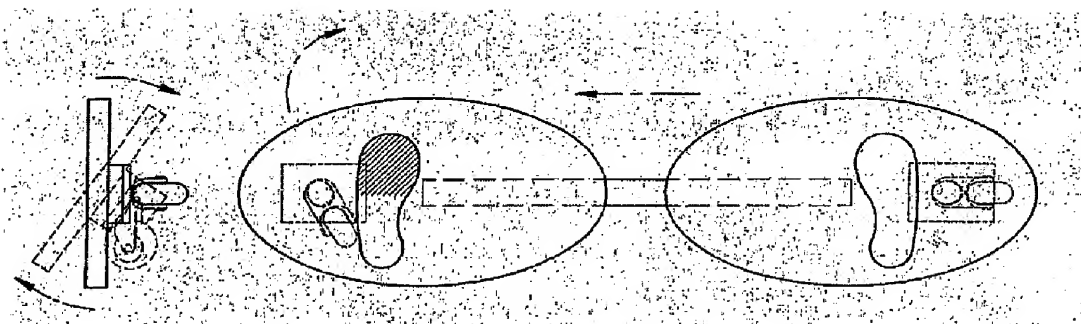
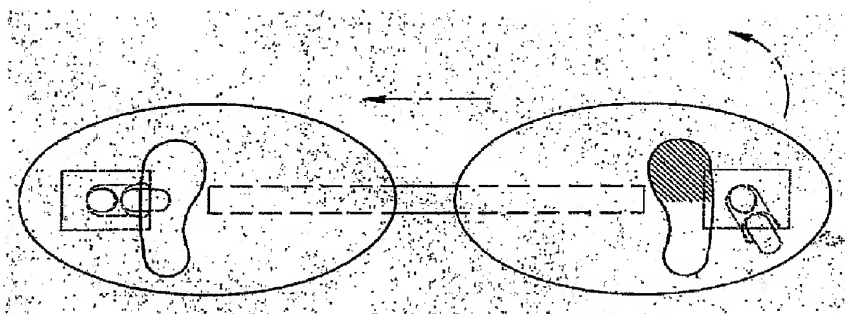


FIG. 3b



3/7

FIG. 3c

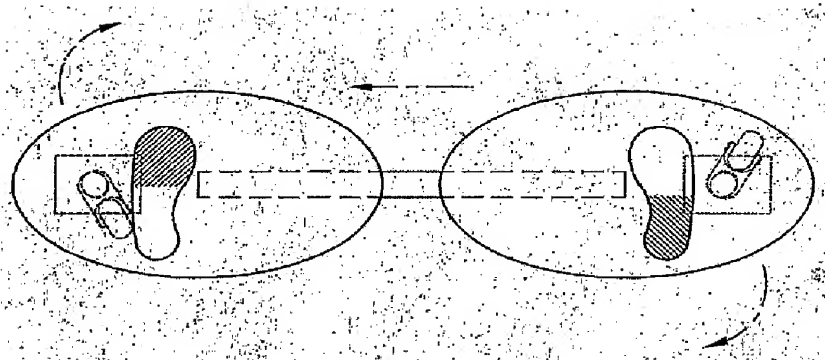
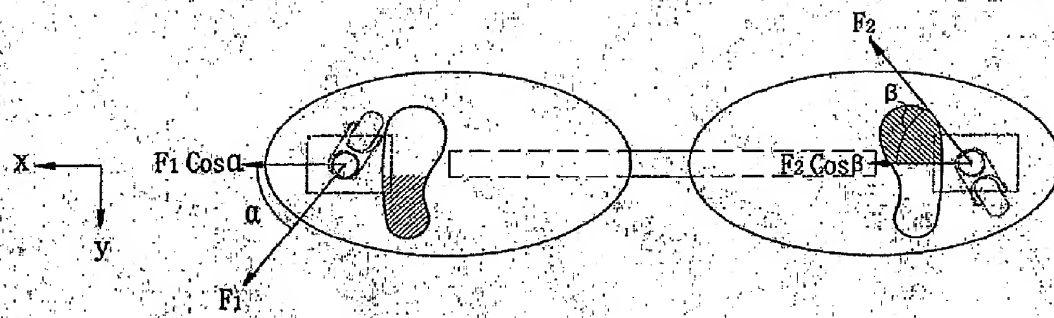


FIG. 3d



4/7

FIG. 4a

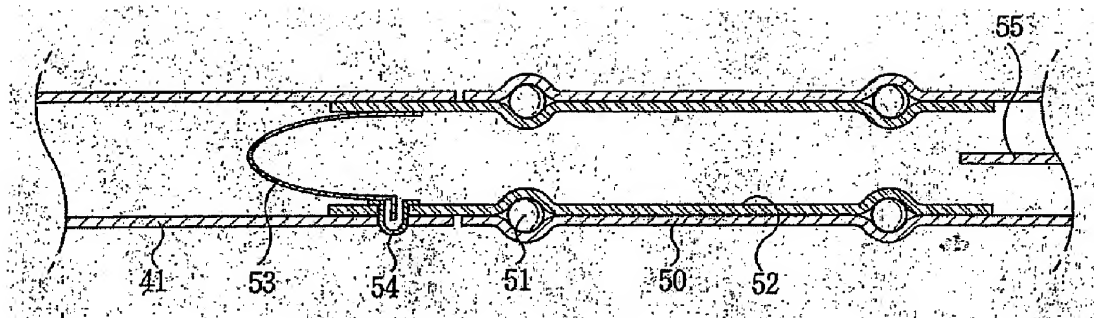
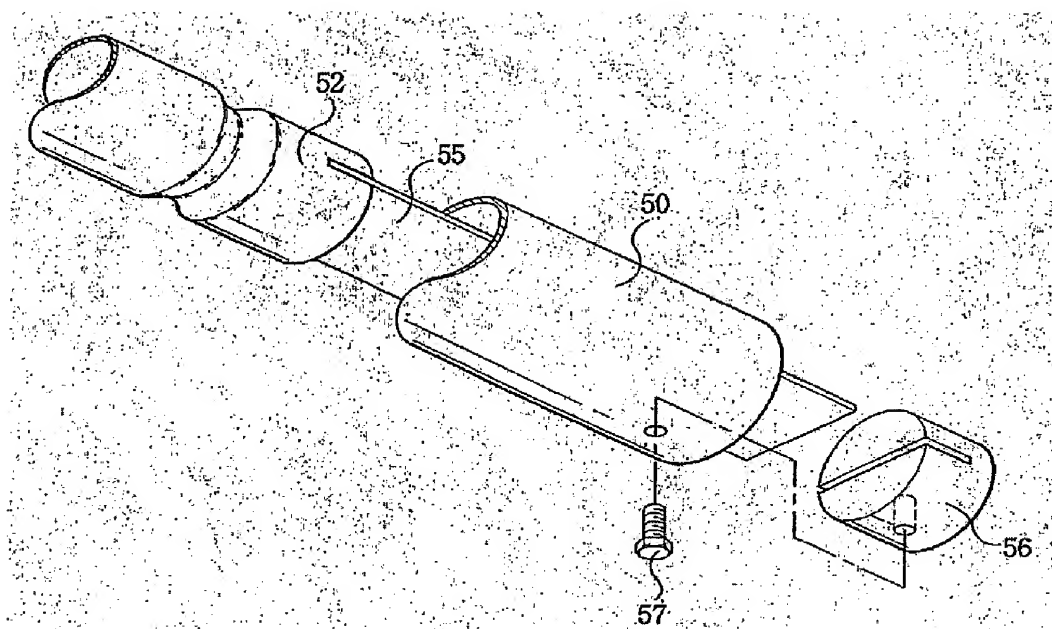


FIG. 4b



5/7

FIG. 5a

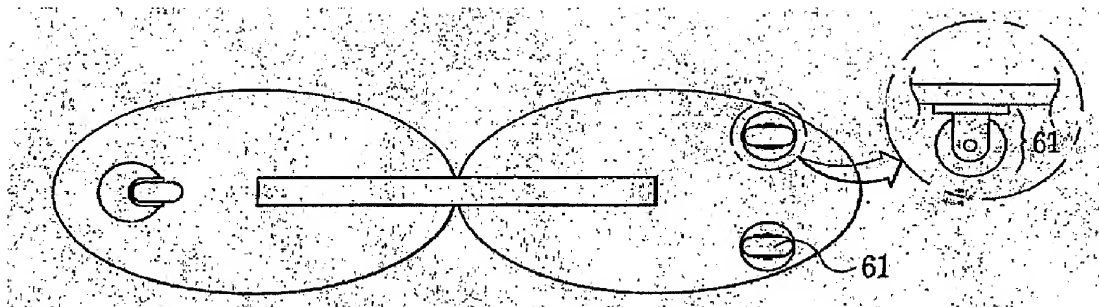


FIG. 5b

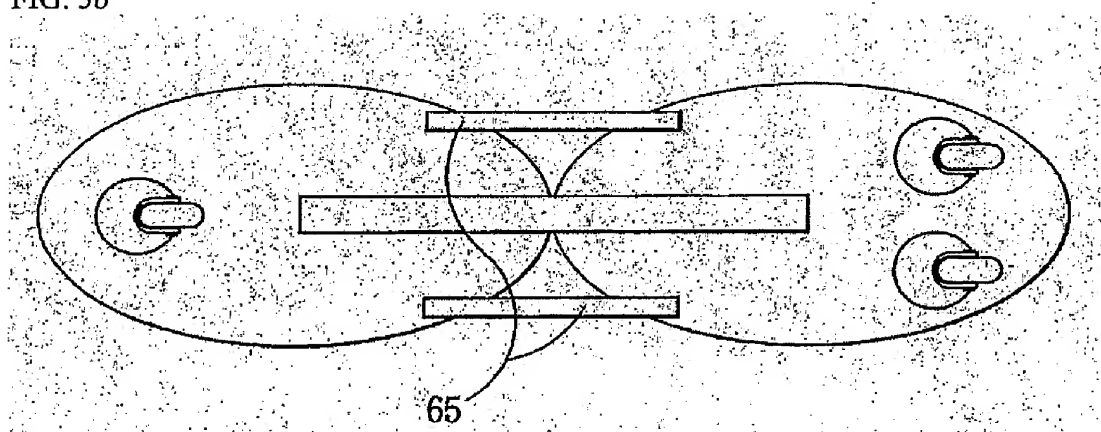
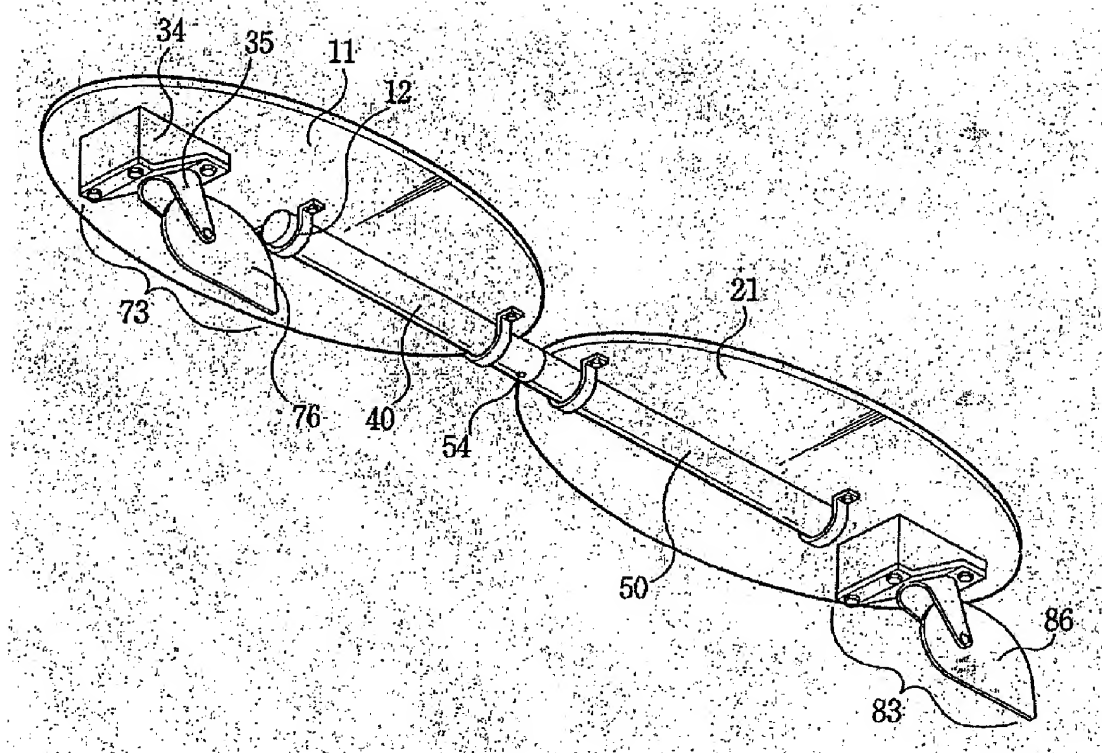




FIG. 6



7/7

FIG. 7a

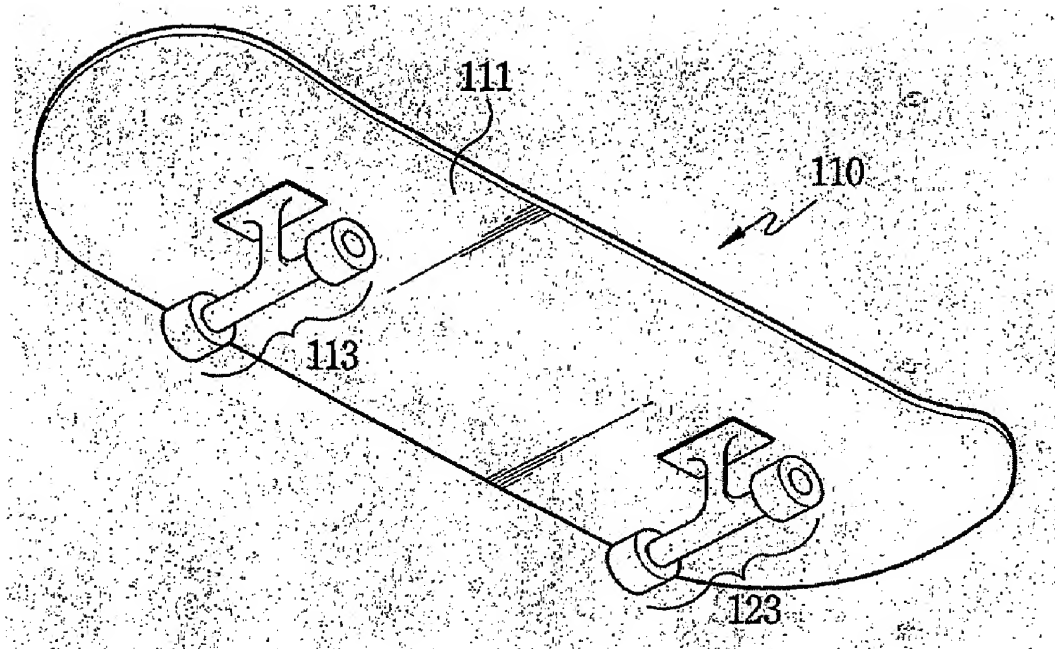
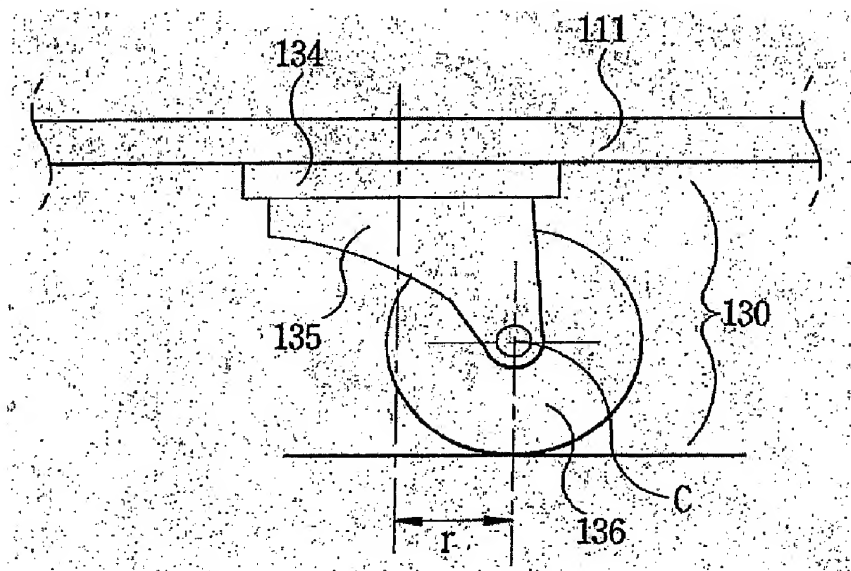


FIG. 7b



## INTERNATIONAL SEARCH REPORT

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**A. CLASSIFICATION OF SUBJECT MATTER**

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According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC717/00, 17/01, 17/02, 17/04, 17/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
KR, JP: classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2001-29663A(TAKAHASHI KOJI) 6 FEBRUARY 2001 See the entire document.	1-5
A	US 5492345A(Leszek kruczek) 20 FEBRUARY 1996 See the entire document.	1-5
A	US 4451055A(Robert E. Lee) 29 MAY 1984 See the entire document	1-5
A	US 5347681A(James P. Watron) 20 SEPTEMBER 1994 See the entire document	1-5

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Authorized officer

KANG, Jung Seok

Telephone No. 82-42-481-5450

